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## BOTANICAL OBSERVATIONS IN WESTERN WYOMING.

BY DR. C. C. PARRY.

—♦—  
No. 3.

THE very full botanical list contained in Hayden's Reports for 1871-72 includes most of the plants met with in the Upper Yellowstone basin, being comprised within the limits of the Yellowstone National Park. But as no attempt is made in the above reports to present the subject in its physiographical aspects, and the list as a whole embraces plants derived from other distinct botanical districts, I propose to continue the itinerary sketch of the botanical features presented on our route, noting the characteristic, peculiar, or undescribed plants as they are cursorily brought to view.

The elevated, irregular and bare mountain ridges that bound the Upper Yellowstone basin on the east command by far the finest prospect of this remarkable district. In approaching from any other direction, the distant view is mainly shut off by the dense pine forests that almost continuously cover the adjoining country; but from the Stinking Water divide, reaching above the timber line, the unobstructed view takes in the whole scope of adjoining woodland, the broad expanse of the lake with its deeply indented shores and rocky islets, and on a clear morning wreaths of misty fog, which, rising here and there out of the forest depths, reveal the locality of steam jets or boiling springs.

On leaving these attractive heights to plunge into the sombre forests, we soon lose the peculiar subalpine flora, which gives place to more common woodland forms.

*Aquilegia flavescens* of Watson is especially abundant with its loose straggling habit and light yellow blossoms, less showy than most species of this attractive genus.

*Ledum glandulosum* Nutt. is here noticed for the first time on our route, forming bushy clumps with laurel-shaped leaves, and scant clustered heads of white flowers.

*Erythronium grandiflorum* Pursh here presents in form and habit an exact western counterpart, on a larger scale, of our well known eastern species. Mosses and wood lichens in greater pre-

fusion and variety indicate a moister climate; and along the borders of innumerable springs and ice-cold brooks grow the ordinary forms before noticed, including species of *Cardamine*, *Saxifraga*, *Mitella*, *Mimulus*, *Mertensia*, *Habenaria*, etc., etc.

The absence of any well-marked trails, and the annoying obstruction of fallen timber, obliging frequent détours, are apt to confuse the sense of direction even in those most experienced in wood-craft, and frequent reference to the compass is necessary to maintain a direct course. It is therefore a great relief, both to man and animals, to emerge occasionally into open grassy valleys, which offer something else to engage the eye and thought more pleasantly than dodging the scraggy branches of overhanging pine trees, or devising the best way of escape from a perfect maze of fallen trees. To the botanist especially these little open parks afford the most satisfactory field for observation and collection, however seriously interfered with by the persistent annoyances of insect pests. The Gramineæ here brought to view comprise the ordinary northern forms, including *Phleum alpinum* L., *Vilfa asperifolia* Nees and Meyen, *Agrostis scabra* Willd., *Muhlenbergia Mexicana* Trin., *Calamagrostis Canadensis* Beauv., *Calamagrostis Lapponica* Trin., *Koeleria cristata* Pers., *Melica bulbosa* Geyer., *Poa Andina* Nutt., *Festuca ovina* L., *Bromus breviaristatus* Thurber, *Triticum ægiopoides* Turcz., etc., etc. The Cyperaceæ are represented by *Eriophorum polystachyon* L., *Carex rigida* Good., *C. Jamesii* Torr., *C. Douglasii* Boott, *C. aquatilis* Wahl., *C. Raynoldsii* Dewey, *C. leporina* L. and *C. tenuirostris* Olney, ined.

On reaching the shore of Yellowstone Lake the great variety of exposure bordering this magnificent body of water, at an elevation of seven thousand four hundred feet above the sea level, added material attractions to the native flora. High bluff banks here alternate with stretches of sandy or gravelly beach, while numerous inland lagoons, frequently heated by boiling springs, maintain a local temperature often too high for the ordinary phænogamous plants. When, however, this source of internal heat is properly tempered, there is induced a profuse hot-bed growth. But the specific forms are not materially different from those elsewhere exhibited. Strikingly conspicuous among less showy plants were the profuse blossoms of *Gentiana detonsa* Fries, presenting flowers of unusual size, and streaked with the most delicate shades of azure blue. A peculiar form of *Pentstemon secundiflorus* Benth.

was equally distinguished by its brilliant colors and cultivated style of growth. Of other plants affecting such locations we may mention *Spraguea umbellata* Torr., *Chænactis Douglasii* Hook., *Eunanus Fremontii* DC., and, more singular in its associations with neglected fields and gardens, *Brunella vulgaris* L. and *Scrophularia nodosa* L.

Another peculiar plant of this district is that characterized by Dr. Torrey in Hayden's Report as a new genus of Lobeliaceæ, viz: *Porterella carnulosa* Torr. By some inadvertence the synonym of the original plant, described in Botany of Beechey's Voyage, page 362, under the name *Lobelia carnosula* H. and A., was quoted as *Lobelia carnulosa* H. and A., and the changed name adopted for the typical species of this proposed genus. It is still doubtful whether the distinguishing characters are sufficient to entitle this plant to generic rank as distinct from *Lobelia*. The localities in which it was invariably found were recently exsiccated pond-holes in open grassy valleys, which it adorned profusely with its delicate blue flowers; it was here quite constantly associated with *Nasturtium curvisiliqua* Nutt.

While searching in similar localities near the falls of the Yellowstone for fruiting specimens of the latter plant, my attention was directed to a dense subaquatic growth, occupying the basin of a shallow muddy pond. This proved to be *Isoetes*, which Dr. Engelmann, who has assiduously studied this difficult genus, has characterized under the name of *Isoetes Bolanderi* var. *Parryi*. (See Appendix, No. 307.) The numerous additions to this genus, lately made under the inspiring influence of Dr. Engelmann's researches, show how largely dependent is the introductory work of the botanical collector on the supplementary labors of the herbarium botanist.

On the elevated grassy slopes, which at different points afford an agreeable relief to the uniform forest growth, we invariably encounter a well marked subalpine flora in the prevalence of such attractive forms as the following, namely: *Caltha leptosepala* DC., *Oxytropis nana* Nutt.? *Astragalus Kentrophyta* Gray, *Bupleurium ranunculoides* L., *Aster pulchellus* DC. Eaton, *Erigeron ursinum* DC. Eaton, *Aplopappus suffruticosus* Gray, and *Senecio amplexans* Gray. At lower elevations the same open character of country, agreeably set off with copses of *Abies grandis* Lindl., afford a still larger number of interesting forms, including *Ribes*

*viscosissimum* Pursh, *Peucedanum leiocarpum* Hook., *Ligusticum scopulorum* Gray, *Lonicera cærulea* L., *Aster conspicuus* Lindl., *A. integrifolius* Nutt., *A. elegans* Torr. Gray, *A. Engelmanni* Gray, *Senecio triangularis* Hook., *S. Andinus* Nutt., *Hieracium Scouleri* Hook., *Gaultheria myrsinites* Hook., *Orthocarpus Parryi* n. sp. Gray (see Appendix, No. 218), *Echinosperrum deflexum* Lehm., *Spiranthes Romanzoffiana* Cham., *Fritillaria pudica* Spreng., *Calochortus eurycarpus* S. Watson, *Botrychium simplex* Hitchcock.

At the head of Yellowstone Lake, fringing the muddy shores of one of its numerous inlets, was found in great abundance the well known European plant, *Subularia aquatica* L. This has been regarded as one of the rarities on the American continent, and has been termed by Dr. Gray one of "the late lingerers" which has just managed to maintain its foothold in a few isolated New England lakes: but it seemed to be quite at home on the banks of the Yellowstone. While it is by no means unlikely, as suggested by Dr. Gray, that from its diminutive size and mode of growth, it may have been overlooked in intermediate localities, its occurrence here, in such profusion, so remote from any recognized connection with an ancestral source, is very suggestive in its bearing on the question of geographical distribution, and derivative origin of species. Certainly the localities on this continent where it might have persisted, if originally spread round the northern hemisphere, are sufficiently numerous not to leave such wide gaps as that between Maine and Wyoming! Doubtless, as in other apparently unaccountable cases, future discovery either east or west will help to fill up this chasm.

In the numberless ponds and lagoons which occur near the head of Yellowstone Lake only the usual forms of northern aquatic plants were noticed, including *Ranunculus aquatilis* L., *Nuphar advena* Ait., *Utricularia vulgaris* L., *Lemna trisulca* L., *Typha latifolia* L., *Sparganium simplex* Huds., *Zannichella palustris* L., *Potamogeton perfoliatus* L.

In none of these promising localities was I able to detect the *Nuphar polysepalum* Engel., which seems singularly to affect isolated localities.

The various confervoid growths and obscure vegetable organisms in connection with the numberless hot springs of this region will no doubt reward the special researches of the microscopical

botanist with new and peculiar forms. Before taking final leave of the Yellowstone Park district, it may be proper to allude briefly to the character of the forest growth, so obtrusively forced on the attention of the traveller. Not less than ninety-nine per cent. of the pine growth of this district is made up of the single species, *Pinus contorta* Dougl. Mile after mile of continuous forest may be traversed without seeing any other arborescent species, and their tall, straight, uniform trunks and scattering foliage will be always associated with the monotonous and disagreeable features of the park scenery. Only where the blazing camp-fire sends forth its grateful warmth to relieve the ordinary chill of a night temperature, where the thermometer in August ranges between 36°F. and 14°F., do we realize a manifest utility in this wide-spread forest production. Occasionally, in low moist ground, the balsam (*Abies grandis*) comes in to vary the sombre scenery, and add a deeper gloom to these shaded recesses. On higher mountain ridges, *Abies Engelmanni* Parry makes its appearance, always indicating an elevation of between eight thousand and nine thousand feet above the sea. With this latter is associated, as in the higher mountains farther south, *Pinus flexilis* Torr., but at no point was seen in this district the more exclusively alpine form, *Pinus Balfouriana* Murray.

*Abies Menziesii* Lindl., which is credited to the park district in Prof. Porter's list, was not seen by me, and as my attention was particularly directed to this subject of forest distribution, it could hardly have been overlooked. It is possible that some of the peculiar forms of *Abies Engelmannii*, in which the cones with their lengthened scales approach *Abies Menziesii* (though still plainly distinct), may have been mistaken in herbarium specimens for this latter species, which was not met with on our route after leaving Wind River valley.

Our route from the southern head of Yellowstone Lake passed by an almost insensible grade to one of the numerous eastern branches of Snake River; thence, skirting along the irregular mountain range to our left, we passed in full view of the Grand Tétos on our right, from which, making a sharp détour to the east, we reached a low divide at the head of Wind River. On this part of our route, being late in the season and on a hurried march, but little opportunity was afforded for botanizing. The general aspect of the flora, as judged from the autumnal forms, was

not materially different from other districts passed over in our previous route. Of plants not elsewhere noticed may be mentioned *Sphaeralcea acerifolia* Nutt. and *Rudbeckia occidentalis* Nutt. Near the summit of the high rocky peak overlooking Snake and Wind River valleys was found a new species of *Draba* characterized by Dr. Gray, under the name of *Draba ventosa* n. sp. (see Appendix, No. 15): also *Aster montanus* Rich, the latter only known from high northern collections in British America.

From this accessible pass, by which the Yellowstone Park can be reached on a very direct route, we passed rapidly down the open valley of Wind River and reached our previous rendezvous at Camp Brown, on September 12th, after just two months' absence.

NOTE.—An appendix, containing characters of new species, etc., will follow and conclude this series of articles.

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## REVIEWS AND BOOK NOTICES.

THE ZOOLOGICAL RECORD FOR 1871.\*—To those who live away from libraries and would keep themselves informed as to the annual progress in any department of descriptive zoology, this record is invaluable. Working naturalists, also, more favorably situated, cannot do without it. We have found but few omissions in it, and American articles and memoirs are faithfully reported. The volume has been slow in making its appearance, and we hope better fortune and better health will fall to the lot of the editor and his assistants in the preparation of the volume for 1872.

## BOTANY.

THE FERTILIZATION OF GENTIANA BY HUMBLE BEES.—The closed gentian (*Gentiana Andrewsii*) has flowers an inch and a quarter or more in length. These inflated, bright blue flowers of late autumn appear to be always in the bud, as they never open. The corolla is twisted up so as to leave no opening at the top. The flowers are all nearly erect with two stigmas considerably above the five anthers. I see but one way in which it can be fertilized, that is by insects. Several of my students, as well as myself

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\* Being vol. viii, of the Record of Zoological Literature, edited by Alfred Newton, London, 1873. Van Voorst. 8vo. pp. 496.